



THE IVORY WAR

Scientists have found a way to fight the sale of illegal elephant ivory. Will it be enough to save the endangered animals?

More than 20 years ago, countries around the world agreed to ban the trade of elephant ivory. The ban was an attempt to stop the killing of elephants for their tusks, which are made of ivory and sell for as much as \$18,000 per kilogram (2.2 pounds). But poachers, sellers, and buyers secretly continued to trade ivory anyway—killing an estimated 25,000 elephants for their tusks each year.

Now scientists may have found a way to help enforce the law and bring poachers and traders to justice. Surprisingly, their method involves one of the most deadly weapons ever created: the nuclear bomb.

What does a nuclear weapon have to do with saving elephants? To get the connection, you need to learn a

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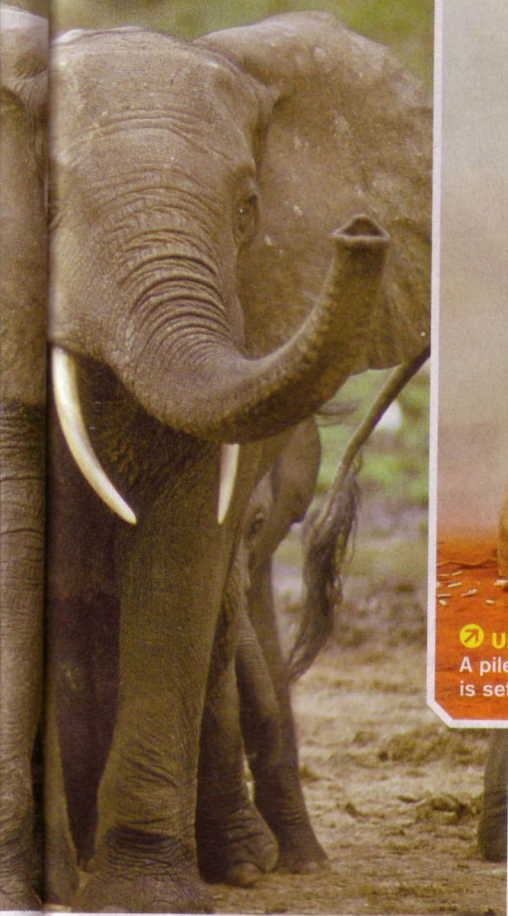
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HERD HANGOUT:
Forest elephants in
Dzanga Bai, central Africa



UP IN FLAMES:
A pile of illegal ivory
is set ablaze in Kenya.

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little more about the ban on ivory, and nuclear-weapons testing that happened decades ago.

ILLEGAL IVORY

The 1989 worldwide ban on selling ivory made much—but not all—of the trade illegal: People are allowed to keep and sell ivory obtained before the ban went into effect, but new ivory is off-limits.

Many ivory sellers cheat by pretending their ivory is from elephants that died before the ban, since that ivory can be sold legally. It can be tough for the authorities to know if someone is telling the truth about the age of his or her ivory.

That's where the nuclear tests come in. Scientists have discovered that chemical remains from

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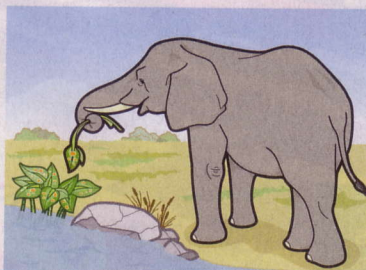
REVEALING IVORY'S AGE



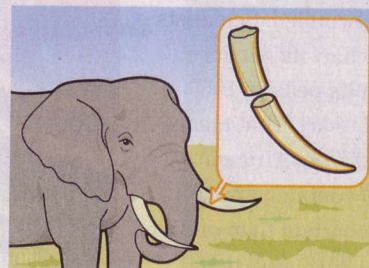
1 Nuclear-bomb testing in the 1950s disperses radiocarbon throughout the world.



2 Worldwide, plants' leaves take up the radiocarbon.



3 When an elephant eats plants, it ingests the radiocarbon—which becomes incorporated into its tusks.



4 Elephants living just after nuclear bombs were tested have more radiocarbon in their tusks than elephants born later.



ELEPHANT AFFECTION: Young African elephants clasp their trunks together while playing.

nuclear-weapons testing can reveal whether or not traders are lying about the age of their ivory.

WARTIME BENEFITS

In the 1950s, during the Cold War, the U.S. and the Soviet Union conducted extensive testing of nuclear bombs. These massive explosions released *radiocarbon*, a radioactive type of carbon, which plants all around the world absorbed. When an elephant eats those plants, traces of radiocarbon become part of its tusks (see *Revealing Ivory's Age*, p. 9).

Since bomb testing declined in the 1960s, the level of radiocarbon in plants has dwindled. Scientists can chart its decline from its peak in 1955 until today. That means a leaf from Africa in 1970 contained more radiocarbon than one from 2013. And that means an elephant that ate leaves in 1970 has more radiocarbon in its tusks than a young elephant munching on

leaves today. Scientists can now study traces of this radiocarbon in elephant tusks to determine when the animal lived—and when it died, thanks to the work of Kevin Uno and his colleagues.

TOOTH TACTICS

Uno, a geochemist at Columbia University in New York City, knew he wanted to help elephants after visiting Samburu National Reserve in Kenya in 2009. Nearly 60 percent of elephants that have died there in recent years were killed by poachers.

Uno studies chemical signatures in the teeth of ancient animals

to learn about their diet and environment. “The teeth are like tape recorders,” he says. “They can tell us what kind of climate [the animal] lived in, or whether [that animal’s] diet changed.”

That gave Uno an idea: Maybe he could apply the same techniques to elephant tusks to learn something about the animals that could protect them. Tusks, which are long, protruding teeth, are particularly good record keepers because they grow a new layer of tissue every day. Each new layer reflects what the elephant ate. Tusks also reveal the level of radiocarbon in the tissue.

CARBON CLUES

Using *radiocarbon dating*, Uno and his colleagues investigated tusks from elephants, teeth from hippos, and hair from primates to see if their testing could determine when the animals had died. He only needs a tiny sample of ivory to do the test. The samples were from places that



SNEAKY SMUGGLERS: This illegal ivory was confiscated after ivory traders tried to disguise it as candy by coating it in chocolate.

keep good records, like zoos, so it was known when each animal passed away. At the end of the testing, Uno received encouraging news: The carbon test accurately indicated when the animals had died.

Uno hopes governments will use radiocarbon dating to figure out if someone is illegally selling ivory from elephants killed after the 1989 ban.

PUNISHING POACHERS

Uno's technique can help catch criminals, but he says countries also need to have much stricter punishments for poachers.

Illegal ivory is often sold to customers in China, Japan, and Thailand. They pay top dollar for ivory, which they carve into artwork

CORE QUESTION

Explain in your own words how radioactive carbon in a piece of ivory can reveal whether the ivory is legal or illegal.

and religious figures (see *Ivory Trade Map*, below). Those caught selling ivory illegally are often fined only a few hundred dollars. "The ivory-trading network is worth some 15 or 20 billion dollars a year," says Uno. "We need much stronger punishment to really stop the poaching."

Uno says it's also crucial to decrease the demand for ivory in Asia. One way is through education. "[Many] people in Asia, where demand is highest, have no idea that an elephant must be killed to get ivory," he says.

PROMOTING PROTECTIONS

In July, President Barack Obama announced a \$10 million campaign to train police and park rangers in Africa so they're better able to

combat poachers. In the fall, the U.S. destroyed a six-ton pile of confiscated ivory. It wants poachers to get the message that the illegal ivory trade will be stopped.

Andrea Turkalo, who studies elephant communication at Cornell University in New York, hopes that happens soon, so elephants won't become extinct. About 96 elephants are killed every day, according to recent reports.

Turkalo has spent many years observing elephants in the Central African Republic. She can recognize individual elephants. "They have faces, personalities, certain ways of walking and protecting each other," says Turkalo. "They become very upset if they witness a family member get hurt."

Scientists like Turkalo and Uno agree: Now is the time to take action if we're to save these amazing creatures. ✨ —Amy Barth

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